

REMARKS

Please reconsider the application in view of the above amendments and the following remarks. Applicant thanks the Examiner for carefully considering this application.

Disposition of Claims

Claims 1-29 are pending in this application. Applicant respectfully notes that claims 1-28 were previously cancelled and new claim 29 was added in a preliminary amendment filed December 29, 2003. Applicant thanks the Examiner for carefully considering claims 1-28. In view of the Examiner's examination of claims 1-28, Applicant respectfully requests to reinstate claims 1-21 for further prosecution on the merits and to cancel claims 22-29 in this reply. Claims 1, 5, 10, and 16 are independent. The remaining claims depend, directly or indirectly, from claims 1, 5, 10, and 16.

Objections

The drawings are objected to for failing to show every feature of the invention specified in the claims. In particular, the Examiner asserts that none of the drawings (Figs. 1-17) explicitly show the claimed elements or features relating to "determining the axial force" by "combining axial force acting on the cutting elements," as recited in independent claims 1 and 10 or the "combining the volume of each crater," recited in independent claims 5 and 16. This rejection is respectfully traversed.

In the Office Action, the Examiner alleged that 37 C.F.R. 1.83(a) ("Rule 1.83") requires every feature specified in the claims must appear in the drawings. However, the Examiner takes Rule 1.83 out of context. Specifically, Rule 1.83 is based on 35 U.S.C. § 113 reciting in pertinent part, "[t]he applicant shall furnish a drawing where necessary for the

understanding of the subject matter sought to be patented.” 35 U.S.C. § 113 (2005); 37 C.F.R. 181(a) (2006); MPEP 608.02. Thus, the Rule 1.83 requirement that every feature of the invention specified in the claims must appear in the drawings is only a requirement when a drawing is necessary for the understanding of the subject matter sought to be patented.

In the present case, additional drawings are not required for understanding of the subject matter. Applicant respectfully submits that the specification clearly describes the claimed elements or features relating to “determining the axial force” by “combining axial force acting on the cutting elements” or “combining the volume of each crater,” on, for example, page 20, in the paragraph starting on line 1 and the paragraph starting on line 14.

In view of 35 U.S.C. § 113, because one of ordinary skill in the art would be able to replicate the teachings of the present disclosure in the specifically claimed embodiments, no additional drawings are required to understand the claimed subject matter. As such, Applicant requests withdrawal of the Examiner’s rejection.

Double Patenting

Claims 1-28 stand rejected on the ground of non-statutory obviousness-type double patenting as being unpatentable over claims 1-9 of U.S. Patent No. 6,873,947. Further, claims 1-28 are rejected on the ground of non-statutory obviousness-type double patenting as being unpatentable over claims 1-28 of U.S. Patent no. 6,785,641.

Pursuant to 37 C.F.R. §3.73(b), the undersigned encloses herewith a terminal disclaimer with respect to the patents above, rendering this rejection moot. Accordingly, withdrawal of the double patenting rejection is respectfully requested.

Rejections under 35 U.S.C. §101

Claims 1-4, 10-15, and 22-28 stand rejected under 35 U.S.C. §101 because the claimed invention is drawn to non-statutory subject matter. Claims 22-28 have been cancelled in this reply. Accordingly, the rejection with respect to claims 22-28 is now moot. Independent claims 1 and 10 have been amended in this reply to clarify the present invention recited. To the extent that this rejection may still apply to the amended claims, the rejection is respectfully traversed.

Claim 1, as amended, recites a method for determining an axial force acting on each one of a plurality of roller cones on a roller cone drill bit during drilling, the method including calculating, from a geometry of cutting elements on each of the roller cones and an earth formation being drilled by the drill bit, an axial force acting on each of the cutting elements, incrementally rotating the bit and recalculating the axial forces acting on each of the cutting elements, repeating the incrementally rotating and recalculating for a selected number of incremental rotations, combining the axial force acting on the cutting elements on each one of the roller cones, and graphically displaying the axial force acting on each one of the plurality of roller cones.

Claims 10, as amended, recites a method for balancing axial forces acting on each one of a plurality of roller cones on a roller cone drill bit during drilling, the method including calculating, from a geometry of cutting elements on each of the roller cones and an earth formation being drilled by the drill bit, an axial force acting on each of the cutting elements, incrementally rotating the bit and recalculating the axial forces acting on each of the cutting elements, repeating the incrementally rotating and recalculating for a selected number of incremental rotations, combining the axial force acting on the cutting elements on each one of

the roller cones; and adjusting at least one bit design parameter, repeating the calculating the axial force, incrementally rotating and combining the axial force, until a difference between the combined axial force on each one of the roller cones is less than a difference between the combined axial force determined prior to adjusting the at least one initial design parameter, and graphically displaying the axial force acting on the plurality of roller cones.

Applicant notes that a claimed invention as a whole must accomplish a practical application. That is, it must produce a “useful, concrete, and tangible result.” *State Street*, 149 F.3d at 1373, 47 USPQ2d at 1601-02. Independent claims 1 and 10 have been amended to clarify the present invention recited. In particular, claims 1 and 10, as amended, include a practical application with a useful, concrete, and tangible result, as each claim recites graphically displaying the axial force acting on the plurality of roller cones. Thus, the claimed invention is statutory. Dependent claims are statutory for at least the same reasons. Accordingly, withdrawal of this rejection is respectfully requested.

Rejections under 35 U.S.C. §102

Rejection under 35 U.S.C. §102(e)

Claims 1-28 stand rejected under 35 U.S.C. §102(e) as being anticipated by U.S. Patent No. 6,213,225, issued to Chen (“Chen”). Applicant respectfully submits that the Declarations under 37 C.F.R. §1.131 and corresponding exhibits by Christopher Cawthorne and Sujian Huang filed January 15, 2004 and May 25, 2004 in the parent case, Application No. 09/635,116 (now Patent No. 6,873,947), establish the reduction to practice of the present invention prior to the earliest effective filing date of Chen, *i.e.*, August 31, 1998. Should the Examiner require an additional Declaration under 37 C.F.R. §1.131 be filed, the Applicant

requests that the Examiner contact the undersigned at his earliest convenience. Chen has been antedated. Thus, Chen has been removed as a valid prior art reference, thereby rendering this rejection moot. Accordingly, withdrawal of this rejection is respectfully requested.

Rejection under 35 U.S.C. §102(b)

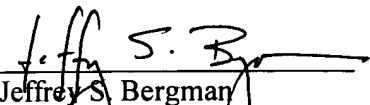
Claims 22-28 stand rejected under 35 U.S.C. §102(b) as being anticipated by "The Operational Mechanics of The Rock Bit," by Ma, *et al* ("Ma"). Claims 22-28 have been cancelled in this reply. Accordingly, this rejection is now moot.

Conclusion

Applicant believes this reply is fully responsive to all outstanding issues and places this application in condition for allowance. If this belief is incorrect, or other issues arise, the Examiner is encouraged to contact the undersigned or his associates at the telephone number listed below. Please apply any charges not covered, or any credits, to Deposit Account 50-0591 (Reference Number 05516/056003).

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Respectfully submitted,

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Attachments